The Open University

S382

Errata

This document lists errors identified during previous presentations of the module. As the books have been reprinted recently, this errata document is applicable only if you have received the original editions of the books. Please check the page opposite the first contents page of each book to see whether you have received the original version or the reprinted version. The original versions will have 1.1 at the bottom of the page and the reprints will have 1.2. (Note that both versions have the same published/copyright year 2010.) All known errors have been corrected in the reprinted versions which are available to download from the S382 website. New errors identified during the current presentation of this module will be added to the Errata section of the website.

Stellar Evolution and Nucleosynthesis

P.23: Worked Example 1.1 on p23 – in line 8 of the solution replace ρ with the symbol for mean density $\bar{\rho}$.

P.27: In the value of the mass defect listed at the end of the first calculation on this page, the text should read 'Note for future reference that the mass defect, discounting the contribution of the electron–positron annihilations, corresponds to the fraction ≈ 0.0066 of the original mass of four protons.'

P.73: Alongside the expression obtained when differentiating with respect to $\log_e T$ (just above the boxed text), insert the marginal note 'Note that since ν is itself a function of T, this differential equation is an approximation. However, since ν only varies as $T^{-1/3}$, the approximation is adequate in most circumstances.'

P.75: In the last sentence before the summary, delete the phrase '... and zero intercept.'

P.87: In the paragraph below Exercise 4.3, insert the word 'equation' in the sentence 'The derived equation for the high-mass stars ...'.

P.106: At the start of the second paragraph, the ratio is wrong way round. It should say 'The ratio of helium-4 nuclei to beryllium-8 nuclei was shown to be about 21 million to one.'

P.114: The first sentence of Section 5.6 should say 'Recall from earlier ...'.

P.120, 125, 133 and 147: All *lower* limits for stellar masses should have '$M >$' the number and not '$M \geq$' the number.

P.130 and 220: The answer to Exercise 6.2 should be 0.212 not 0.228. So the sentence below Exercise 6.2 should read '... the Fermi energy is $E_F \approx 0.21 m_e c^2$ '.

P.136: In Section 6.3.3 it should say 'In stars of around $11\,M_\odot$ or more ...'.

P.138: In Figure 6.5, the values on the vertical axis should be shown as negative numbers: $-5, -10$ (more negative increasing upwards).

P.149: In the second sentence of Summary item 20, the word 'not' should be 'at'.

P.154: In the fourth paragraph of Section 7.1.3, all occurrences of E_G should be E_{GR} for consistency.

P.156: In Figure 7.1, the images in panels (a) and (b) should be swapped with each other.

P.158: The first sentence of Section 7.2.1 should say '... with the most negative binding energy per nucleon ...'.

P.159: In Equation 7.1, the denominator of the 3rd term should have $m_{\rm n}$ not $m_{\rm p}$. Although at the level of accuracy at which we can work, the difference between using one mass or the other is irrelevant when used in this way, and we may as well use the same figure for both. It's only when taking the difference between the two $(m_{\rm n} - m_{\rm p})$ that it becomes relevant.

P.162: In the fourth paragraph, the reference to Exercise 5.3 should be to Exercise 6.3.

P.169: In Exercise 7.6, the comment in brackets is not needed. Please delete '(Assume a constant rate of change of angular frequency.)'

P.182: The sentence below Exercise 8.5 should refer to Exercise 8.5 part (b).

P.190: In Worked Example 8.1 – the reference to Eqn 1.15 should be to Eqn 1.14.

P.200: Summary item 13 should read 'The initial stellar mass function seems to peak at around 0.5 $M_\odot$ and fall off either side with a power law dependence. This is roughly proportional to $M^{-2.35}$ for masses above $0.5M_\odot$, while below $0.5M_\odot$ the logarithmic slope is similar in magnitude but has the opposite sign. Most stars in the Universe are therefore low-mass M-dwarfs.

P.221: In the answer to Exercise 6.4, there are some erroneous solar mass symbols in the penultimate two lines near the bottom of page 221. The two lines in question should be as follows:

$$R_{\rm WD} = \left(\frac{729}{32\pi^4}\right)^{1/3} \left(\frac{h^2}{5m_{\rm e}}\right) \frac{Y_{\rm e}^{5/3}}{Gm_{\rm H}^{5/3}} M^{-1/3} \times (1.99 \times 10^{30}\ {\rm kg}\ {\rm M}_\odot^{-1})^{-1/3}.$$

Then

$$R_{\rm WD} = \left(\frac{729}{32\pi^4}\right)^{1/3} \frac{(6.626 \times 10^{-34}\ {\rm J\,s})^2}{(5 \times 9.109 \times 10^{-31}\ {\rm kg})} \frac{(0.5)^{5/3} \times (1.99 \times 10^{30}\ {\rm kg})^{-1/3}}{(6.673 \times 10^{-11}\ {\rm N\ m^2\ kg^{-2}}) \times (1.673 \times 10^{-27}\ {\rm kg})^{5/3}} \left(\frac{M}{{\rm M}_\odot}\right)^{-1/3}.$$

The last line is correct.

Equation numbers in Solutions to Exercises:

In the Solution to Exercise 5.1, the equations labelled as '5.9' and '5.10' would be better labelled as 'S5.1' and 'S5.2', since the printed numbers have been used previously for different equations in the body of the Chapter 5.

Transiting Exoplanets

P.13: In the second line of the final paragraph '2000 times the radius ...' should read '20000 times the radius ...'.

P.22: In line 14/15, delete the phrase '... as they would be observed at a distance of 10 pc.'

P.23: The sentence preceding Exercise 1.2 should read 'Jupiter emits almost twice as much power ...'.

P.25: In Figure 1.10 the text on the scale bar is blurred and should read $13''$ (as in the caption).

P.27: In the last sentence of the caption to Figure 1.12 replace '... in the barycentric coordinates shown here.' with ' ... around the barycentre.'

P.31: In Figure 1.14, the label at the top right of the figure reads 'periapsis' whilst the caption refers to this point as the 'pericentre'. These two terms are equivalent.

P.32: Delete the marginal note referring to 'reduced mass' and replace all references to 'reduced mass' with 'relative mass' throughout the book (mainly in Chapter 7).

P.34: In the third equation on the page, the value of $\Delta\lambda/\lambda$ should be 4.3×10^{-8}.

P.35: In the caption to Figure 1.15, the reference to the 'dashed' line should say 'black' line.

P.46: In Summary item 15, the second sentence should say 'Transits are more likely for planets in close-in orbits around large stars.'

P.47: The 6th and 7th lines of the 2nd paragraph should read '... for closer planets around larger stars the probability is even higher.'

P.53: In the paragraph below Table 2.1, the 4th sentence should say 'The sky magnitude indicates the sky brightness per pixel (or sky brightness in a $0.5'' \times 0.5''$ area where the pixels are smaller than this) expressed as ...'.

P.84: In Exercise 2.10, it should say 'The radial velocities of the two spectra differ by $20\,\mathrm{km\,s^{-1}}$'.

P.102 and 300: In Exercise 3.4 (and its solution) the phrase 'light emerging close to the limb of the planet' should say 'light emerging close to the limb of the star'.

P.102: In Figure 3.11 (b), the last number on the wavelength axis should be 1000, not 400.

P.152: In Figure 4.15, the labels for Jupiter and Saturn have been transposed.

P.169: In Figure 5.3, the downward and upward sets of arrows should be labelled as 'downward pressure force $AP(z + \Delta z)$' and 'upward pressure force $AP(z)$' respectively.

P.177: The caption to Figure 5.10(a) should read 'The ultraviolet spectrum of HD 209458 showing ...'.

P.178: The second sentence should refer to Worked Example 5.1 and not Exercise 5.1.

P.181: In Figure 5.14, the silhouette of the planet in the central column of the second row should be in the same location as it is in the central column of the first row (i.e. not offset to the right of centre).

P.193: The second sentence in Summary item 8 should read ... $A_\mathrm{S} > A_\mathrm{RV}$.

P.242: The last sentence of the second paragraph of Section 7.5 should read '... will cause the transit timing of the more massive planet to change with time.'

P.242-243, 253 and 319: Throughout Section 7.5 (and in Summary item 10 and the answer to Exercise 7.8 (a)) transpose all subscripts 1 and 2 in order to be consistent with earlier sections.

P.244: To be consistent with line 1 of page 240, the sentence referring to T_c in the second paragraph of Section 7.6.1 should read: 'Consequently, there will be a time lag between the planet being at the mid-point of its transit (the time that we measure) and the barycentre of the planet-moon system being at the mid-point of its transit (the time that we would otherwise predict and call T_c).'

P.296: In the solution to Exercise 2.10, the paragraph beginning 'Now, if we assume ...' should say '... the minimum value of the radial velocity amplitude is given by *half* the difference ...'.

P.300: In the solution to Exercise 3.4, for the logarithmic limb darkening law, the answer should be '$1 - 0.116 - 0.036 = 0.85$'. Replace the last sentence with 'Although the logarithmic and quadratic laws give very similar answers, the linear limb darkening law gives a slightly different result.'

P.307: In the answer to Exercise 4.3, for GJ581c and GJ581d, the eccentricity should be squared in the term $(1 - e^2)^{1/2}$ on the bottom line of the calculations. So the RV amplitudes for these two planets should be $3.1\,\mathrm{m\,s^{-1}}$ and $2.7\,\mathrm{m\,s^{-1}}$ respectively, and the maximum total amplitude is therefore $20\,\mathrm{m\,s^{-1}}$.